Last Class

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(601.457/657)
Overview

• Midterm Review

• Summary of the Course

• Announcements
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• Summary of the Course
• Announcements
Syllabus

- Image Processing (2D)
- Rendering (3D)
- Modeling (3D)
- Animation (4D)
Syllabus: Image Processing

- Image Representation
  - Sampling
  - Reconstruction
  - Quantization & Aliasing

Discrete Samples * Reconstruction Filter = Reconstructed Function
Syllabus: Image Processing

• Image Representation
  ◦ Sampling
  ◦ Reconstruction
  ◦ Quantization & Aliasing

Original (8 bits)  Quantized (1 bit)  Random Dither (1 bit)  Ordered Dither (1 bit)  Floyd-Steinberg Dither (1 bit)
Syllabus: Image Processing

• Image Representation
  ◦ Sampling
  ◦ Reconstruction
  ◦ Quantization & Aliasing

• Image Processing
  ◦ Filtering
  ◦ Warping
  ◦ Morphing
  ◦ Compositing
Syllabus: Image Processing

• Image Representation
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  ◦ Filtering
  ◦ Warping
  ◦ Morphing
  ◦ Compositing
Syllabus: Rendering

• Global Illumination
  ▪ Ray tracing
    » Ray casting
    » Illumination equation
    » Modeling transformations
    » Hierarchical scene graphs
  ▪ Radiosity
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    » Hierarchical scene graphs
  ◦ Radiosity

• **3D Rendering Pipeline**
  ◦ Modeling transformations
  ◦ Viewing transformations
  ◦ Hidden surface removal
  ◦ Illumination, shading & textures
Syllabus: Modeling

• Representations of geometry
  ◦ **Curves (splines)**
  ◦ Surfaces (meshes, splines, subdivisions)
  ◦ Solids (voxels, CSG)
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Iso-Value $= \delta_1$

Iso-Value $= \delta_2$
Syllabus: Animation

- Key framing
  - Kinematics
  - Articulated figures

- Transformation
  - Interpolation/Blending
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\[
\exp(Id, A) = \exp(A) = Id + A + \frac{1}{2!} A^2 + \frac{1}{3!} A^3 + ... + \frac{1}{n!} A^n
\]
What Else Have We Learned?

• CG is hard
  ◦ Lots of programming
  ◦ Lots of math

• Simple things often work quite well!
  ◦ Example: Illumination equation
  ◦ Example: Key-frame interpolation

• Some things which seem simple, aren’t
  ◦ Creating cool models
  ◦ Getting them to behave well

• Still a lot left to do!
Announcements

• Every semester there is a reading seminar in computer graphics
  ◦ Informal
  ◦ Read and discuss one paper a week
  ◦ You are welcome to join